

NOAA COASTAL MAPPING PROGRAM PROJECT COMPLETION REPORT

PROJECT AL0902-CM-N

Perdido Bay, Alabama and Florida

Introduction

NOAA Coastal Mapping Program (CMP) Project AL0902-CM-N provides a highly accurate database of new digital shoreline data in the vicinity of Perdido Bay in Alabama and Florida, including Wolf Bay and portions of the Intracoastal Waterway. The Geographic Cell (GC) may be used in support of the NOAA Nautical Charting Program (NCP) as well as geographic information systems (GIS) for a variety of coastal zone management applications

Project Design

The Requirements Branch (RB) of the Remote Sensing Division (RSD) formulated the photographic mission instructions for this project following the guidelines of the Photo Mission Standard Operating Procedure Version II. The instructions discussed the project's purpose, geographic area of coverage, scope and priority; photographic requirements; flight line priority; Global Positioning System (GPS) and Inertial Measurement Unit (IMU) data collection procedures and guidelines for both kinematic and static surveys; data recording and handling instructions; and contact and communication information. RB created a Project Layout Diagram, flight maps and input files for the aircraft's flight management system.

Field Operations

The field operations consisted of the collection of static and kinematic GPS/IMU data and the acquisition of digital aerial imagery. Aerial survey operations were conducted with the NOAA King Air (N68RF) aircraft on December 18-19, 2013 and January 19, 2014. All planned flight lines were flown twice, once each in coordination with Mean High Water (MHW) and Mean Lower Low Water (MLLW) tide stages. In each flight both natural color and black & white infrared imagery were collected concurrently using an Applanix DSS-439 dual camera system, resulting in sixteen strips of imagery (750 images). All imagery was acquired at a nominal altitude of 10,000 feet, resulting in an approximate ground sample distance (GSD) of 0.35 meters.

Direct Georeferencing Data Processing

GPS/IMU data for project AL0902-CM-N were processed by RSD personnel to yield precise camera positions and orientations for direct georeferencing (DG) of the imagery. A local GPS base station was established for use as a reference station for kinematic GPS processing operations. The position of the base station was determined using the NGS Online Processing User Service (OPUS), which computed fixed baseline solutions from nearby CORS stations. The airborne kinematic data was processed in January 2014 using POSPAC ver. 6.2. For further information refer to the Airborne Positioning and Orientation Reports (APOR) on file with other project data within the RSD Electronic Data Library.

The processed GPS/IMU data were used to derive precise exterior orientation (EO) values of the camera centers required for digital feature extraction. The predicted horizontal accuracy of the imagery was determined by propagating sensor EO and image measurement uncertainties through the photogrammetric collinearity equations using an Excel spreadsheet based Exterior Orientation Total Propagated Uncertainty (EO-TPU) tool developed by NGS. Using this tool, the predicted horizontal uncertainty at the 95% confidence level was calculated to be 1.5 meters for the imagery used to compile data for AL0902-CM-N. All stereo-models were examined and found to have acceptable levels of parallax for mapping purposes.

Compilation

The data compilation phase of the project was initiated by RSD personnel in July 2015. The work was accomplished using a Digital Photogrammetric Workstation (DPW), which is a configuration of computer hardware, modular software components and other associated peripheral devices. The Feature Extraction module was used within BAE Systems' SOCET SET (version 5.6) photogrammetric software. Feature identification and the assignment of cartographic codes were based on image analysis of the project digital images and information extracted from the appropriate NOAA Nautical Charts, U.S. Coast Guard Light List and other ancillary sources. Feature attribution was assigned in compliance with the Coastal Cartographic Object Attribute Source Table (C-COAST). Selected features were further modified with additional descriptive information to refine general classification.

Spatial data accuracies for Project AL0902-CM-N were determined according to standard Federal Geographic Data Committee (FGDC) practices. Cartographic features were compiled to meet a horizontal accuracy of 3.0 meters at the 95% confidence level. This predicted accuracy of compiled well-defined points is derived by doubling the horizontal uncertainty calculated from the EO-TPU tool.

The following table provides information on the imagery used to complete this project:

Date	Time (UTC)	Color Imagery		Infrared Imagery		Tide Level*
		Roll	Images	Roll	Images	
12/18/2013	19:51 – 19:59	13NC88	27490 – 27541	13NR71	15177 – 15228	-0.16 – (-0.12)
12/18/2013	20:03 – 20:06	13NC88	27542 – 27560	13NR71	15229 – 15247	-0.12 – (-0.14)
12/18/2013	20:12 – 20:16	13NC88	27561 – 27586	13NR71	15248 – 15273	-0.13 – (-0.10)
12/19/2013	18:02 – 18:07	13NC89	27776 – 27803	13NR72	15463 – 15490	0.02 – 0.05
12/19/2013	18:12 – 18:16	13NC89	27804 – 27829	13NR72	15491 – 15516	0.05
12/19/2013	18:32 – 18:35	13NC89	27872 – 27889	13NR72	15559 – 15577	0.02 – 0.03
12/19/2013	19:25 – 19:27	13NC89	28005 – 28014	13NR72	15692 – 15701	0.03
12/19/2013	19:39 – 19:42	13NC89	28037 – 28057	13NR72	15724 – 15744	0.05
1/12/2014	15:30 – 15:37	14NC05	2560 – 2601	14NR04	439 – 480	-0.06 – (-0.05)
1/12/2014	15:41 – 15:47	14NC05	2602 – 2641	14NR04	481 – 520	-0.05 – (-0.06)

1/12/2014	15:53 – 15:56	14NC05	2642 – 2663	14NR04	521 – 542	-0.05
1/12/2014	16:00 – 16:01	14NC05	2664 – 2673	14NR04	543 – 552	-0.05
1/12/2014	16:06 – 16:08	14NC05	2674 – 2681	14NR04	553 – 560	-0.05
1/12/2014	16:14 – 16:17	14NC05	2682 – 2703	14NR04	561 – 582	-0.05 – (-0.06)
1/12/2014	16:22 – 16:25	14NC05	2704 – 2723	14NR04	583 – 602	-0.06 – (-0.05)
1/12/2014	16:34 – 16:36	14NC05	2724 – 2733	14NR04	603 – 612	-0.07

* Tide levels given in meters above MLLW and were calculated using the Pydro software tool with a TCARI grid referenced to verified water level observations at NOS gauges. The height of the MHW tidal datum in the project area varies between 0.24 – 0.37 meters above MLLW.

Quality Control / Final Review

Quality control tasks were conducted during all phases of project completion by a senior member of AB. The final QC review was completed in February 2016. The review process included analysis of the georeferencing results and assessment of the identification and attribution of digital feature data within the GC according to image analysis and criteria defined in C-COAST. The quality control process concluded with an inspection of the topological connectivity within the GC using ArcGIS 10.2.2 software. All project data was evaluated for compliance to CMP requirements.

Comparisons of the largest scale NOAA nautical charts with natural color images and compiled project data resulted in creation of the Chart Evaluation File (CEF). The following nautical charts were used in the comparison process:

11376, Mobile Bay, AL, 1:80,000 scale, 57th edition
11378, Santa Rosa Sound to Dauphin Island, FL-AL, 1:40,000 scale, 38th edition

End Products and Deliverables

The following specifies the location and identification of the products generated during the completion of this project:

Remote Sensing Division Electronic Data Library

- Airborne Positioning and Orientation Report (APOR)
- Project Completion Report (PCR)
- Project database
- GC11167 in shapefile format
- CEF in shapefile format

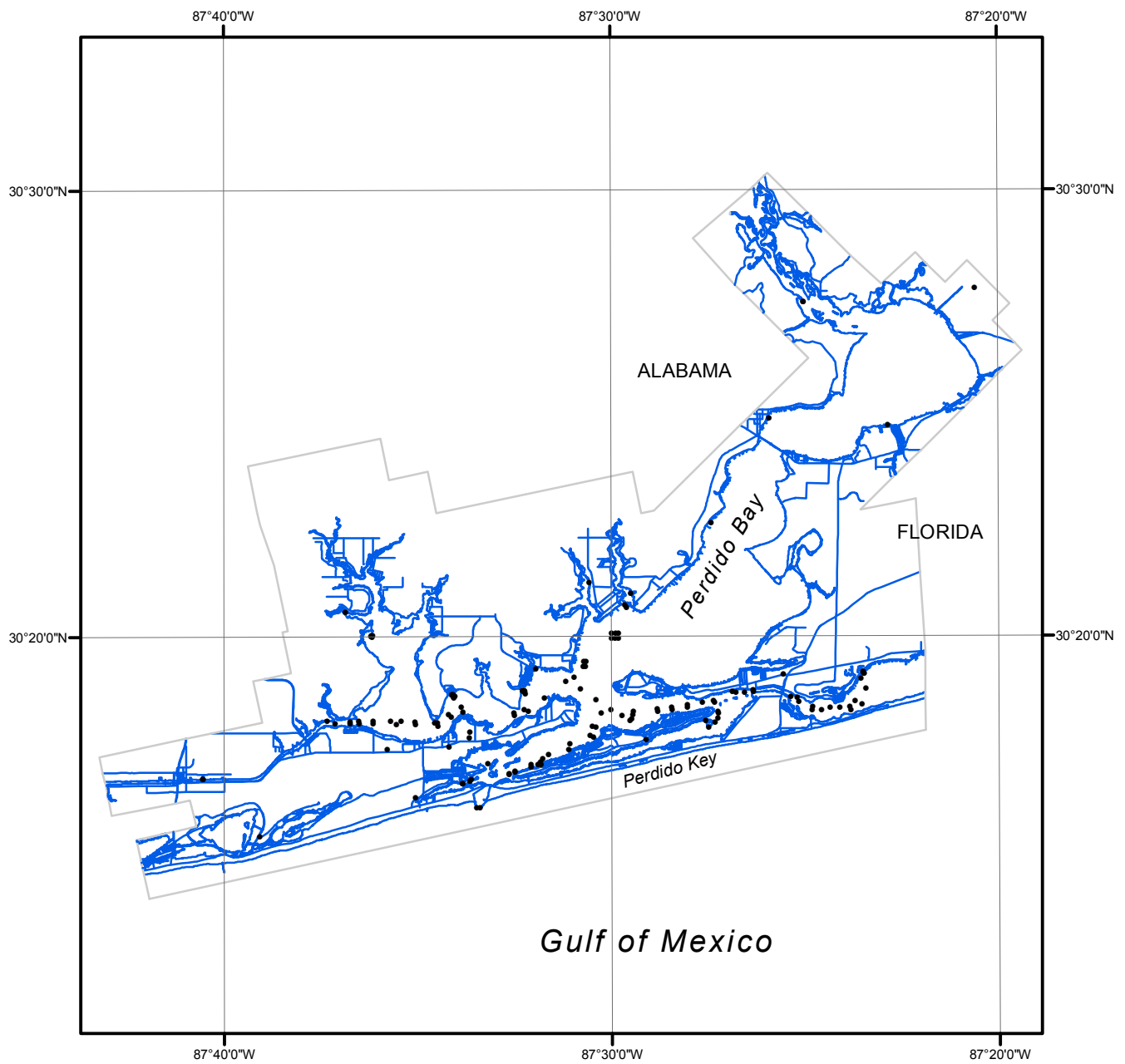
NOAA Shoreline Data Explorer

- GC11167 in shapefile format
- Metadata file for GC11167
- Digital copy of the PCR

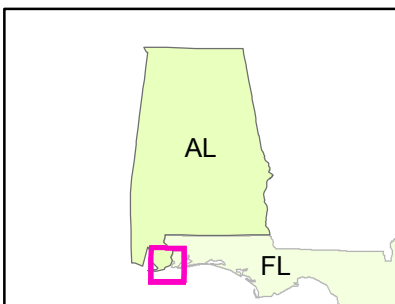
End of Report

PERDIDO BAY

ALABAMA AND FLORIDA



Overview



AL0902-CM-N

GC11167